# PLANT PROTECTION BULLETIN

A Publication of the
WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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## FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, which has been established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information.

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# Plant Protection Bulletin

Vol. I, No. 1 A Publication of the October 1952

World Reporting Service on Plant Diseases and Pests

## Objectives of the Bulletin

L. E. Kirk

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The FAO Plant Protection Bulletin is intended to further the objectives of the International Plant Protection Convention, which was approved by the FAO Conference at its Sixth Session in 1951. There have so far been no centralized arrangements for circulating information on the incidence of plant pests and diseases of economic importance in different countries, on the degree of damage they cause and on their control. As this has greatly handicapped international cooperation in the field of plant protection, the Convention provides for the establishment of a World Reporting Service on Plant Diseases and Pests, which will collect and disseminate information of this type.

### Scheme for the Regions

In response to the announcement by FAO of the initiation of the World Reporting Service, more than thirty FAO Member Governments have already indicated their support and readiness to participate. It is hoped that the development of this Service will stimulate the organisation of more satisfactory national reporting systems for plant pests and diseases in certain other countries where such facilities do not at present exist.

In order to achieve an international network, FAO is especially interested in the establishment of regional plant protection organisations, particularly in regions comprising a number of countries requiring more adequate co-ordination in plant protection activities. These organisations, when established, would constitute the appropriate bodies for promoting the dissemination in the region of information on the incidence and spread of important plant pests and diseases and provide channels through which national plant protection agencies would be more closely linked with the World Reporting Service.

The European Plant Protection Organisation, which has been operating effectively since July 1950, is co-operating fully with FAO in this respect, and the establishment of similar regional bodies is under consideration in Central America and certain other geographic areas.

The present co-ordination and frequent exchange of information relating to plant protection between the United States of America, Canada and Mexico will enable these countries to participate in the World Reporting Service as a group, and the South Pacific Commission will also function in the same way as a regional center.

To enable the World Reporting Service to achieve maximum geographical coverage, FAO relies not only upon the collaborating Governments and regional organisations, but also upon the co-operation of institutions and individual workers who are engaged in field surveys or related activities. Occasional reports from such sources will be welcome.

### Scope of Information

This Bulletin provides a medium for the prompt publication of information received by the FAO World Reporting Service. The following main aspects will be covered:

(1) Incidence and spread of plant pests and diseases of immediate or potential danger.
(2) Occurrence of plant pests and diseases in areas previously free.

(3) Unusual infestations of plant products, excluding those already commonly recognized.
(4) Announcements on plant quarantine measures – imposed, amended or withdrawn.
(5) Effective methods and materials for controlling plant pests and diseases.
(6) Reports on major operations for preventing or controlling plant pests and diseases.
(7) Implementation of the International Plant Protection Convention and supplementary agreements.

This Bulletin will also from time to time present comprehensive reviews of the occurrence and significance of plant pests and diseases in a specific region or related to a specific crop, and summary accounts of the biology and control of specific pests or diseases of international importance.

In introducing this new periodical, I wish to emphasize that the extent to which the World Reporting Service and this Bulletin can contribute to the progress of plant protection will depend upon the extent of co-operation received. FAO sincerely acknowledges its indebtedness to all Governments, regional organisations, scientific institutions and scientists which have agreed to support this enterprise.

# The Desert Locust Situation

O. B. LEAN
FAO Technical Assistance Officer

At least one of the several species of locusts is swarming somewhere in the world almost every year. At the present time the South American locust is active in the New World and the Desert Locust in the Old World. The plague of the Desert Locust (*Schistocerca gregaria*), affecting most areas from eastern Africa to India, has caused considerable alarm and aroused much interest.

This plague is believed to have started in 1948/49 in the Empty Quarter of Arabia from where it spread rapidly to India, Pakistan, Iran, Arabia, East and North Africa. By the winter–spring of 1950/51 the centre of activity was in Iran. Later, during the monsoon period, July–September, the main infestation shifted to Pakistan and India.

During the 1951 breeding season Iran organised an intensive campaign throughout the infested areas which covered the southern half of the country. The Ministry of Agriculture was responsible for the campaign but it received strong reinforcement from the Iranian military. Considerable help was also sent by the Governments of the U.S.A., who operated 6 spraying aircraft; of the U. K. and of the U.S.S.R. This campaign resulted in a reduced eastward migration of swarms of the next generation.

The vigorous campaigns which followed in Pakistan and India, together with climatic conditions unfavorable to the locust, reduced the infestation so greatly that practically no reserve of swarms remained in the eastern region.

Meanwhile, however, a build up of the infestation in south western Arabia and the Somali Peninsula resulted in extensive breeding in East Africa. Exceptionally heavy short rains favored the locusts and severely handicapped control operations carried out by Desert Locust Control in British Somaliland, Ethiopia and a small corner of Kenya and by the Italian Government in Somalia.

## Movement of Hopper Bands

Some 10,000 hopper bands were destroyed but many swarms escaped to fly north in January 1952. These swarms moved very quickly. After crossing the Gulf of Aden and the Red Sea, they flew up Arabia covering 800–900 miles in two weeks. By the end of February they had reached Iraq and Iran. Then the swarms fanned out to cover most of the area comprising Jordan, southern Syria, Iraq, northern Saudi-Arabia, Oman and all south Iran with a few swarms penetrating Egypt and Israel to the west and Pakistan and Afghanistan to the east.

During the spring breeding, control operations were undertaken throughout the

infested zone. The Jordan government, using BHC dry bait, exterminated almost all hoppers. In Iraq the hoppers were killed with bait and by Aldrin sprayed from Point Four Program aircraft.

British units, supported by missions from Jordan and Syria, tackled the breeding areas in Saudi Arabia with the U.S. planes helping out in Kuwait. In Oman operations were hindered by opposition from local tribes. As in 1951, one of the most important campaigns was waged in Iran where again the local organisation received much material help, this time from India, Pakistan, Turkey, U.S.A., U.S.S.R., and FAO. A total area of about one million hectares was treated, two thirds from the ground, one third by aircraft.

The spring campaigns of 1952 have proved the need and the value of international co-operation in locust control. The principle of mutual aid during locust emergencies was established some ten years ago during the previous Desert Locust plague. This season aid has been given on an unprecedented scale. Not only have friendly neighbors rushed insecticides and equipment to threatened countries but for the first time FAO, as an international agency, has contributed material assistance.

FAO flew insecticides and spraying machines to Jordan. In Iran, FAO provided 18 light vehicles which speeded up all operations and particularly those of the American and Russian planes. Some of these vehicles have recently been transferred to reinforce Pakistan, now heavily engaged against a severe locust infestation. FAO also financed an air lift to enable supplies from India to reach Iran in good time.

Throughout the Near East the campaigns were highly successful and all countries, except Iran, were clear of locusts by the end of July. In relation to the very great area infested by hoppers, much of which was in difficult desert and mountainous country, the number of swarms of the next generation that escaped was remarkably few.

Some came out of Oman and migrated to southwestern Arabia and it appears that several swarms developed in eastern Iran. These began to penetrate Pakistan and India in June. Later, further swarms arrived from the west with the result that, by the end of July, the infestation in both India and Pakistan was widespread.

Under the influence of the monsoon the swarms matured quickly and laid eggs. By early August, the hopper infestation was already extensive and can be expected to increase in scale leading to a critical situation which will require very intensive control operations.

The official bulletin from India for the first two weeks of August 1952 reports breeding in Rajasthan over 60,000 square miles, on a scale unprecedented during the 1940–6 and current plagues, of numerous swarms, some very large, covering 100 square miles and one egg field that extended over 150 square miles. Unless this monsoon breeding in India and Pakistan is adequately controlled, severe crop damage may result in both countries and swarms will escape westwards in the autumn to reinfest Iran and Arabia.

### Concentration in East Africa

At the time of writing, Desert Locust activity is not confined to the east. All the swarms which developed from the winter breeding in the Somali Peninsula did not migrate through Arabia. A considerable reserve remained in eastern Africa, particularly in Ethiopia, and these became concentrated and bred over large areas of British Somaliland, Somalia and southern Ethiopia from May onwards.

Although several thousand hopper bands were destroyed, there were again a considerable number of escapes. Most of the new generation swarms are likely to remain in East Africa to breed again over much the same area during the short rains from about October next. A report dated 22 August states that the swarms in this area are numerous and extremely large. A locust specialist with many years experience said that one swarm was by far the largest and most dense he had ever seen.

Recent events have emphasized the great strategic importance of the Somali Peninsula in planning any overall campaign against the Desert Locust. Extensive breeding may occur at least twice a year. The breeding area extends into three to five different countries, mainly in sparsely populated regions where control operations are severely handi-

capped by almost impenetrable thorn scrub traversed by few roads or tracks.

The swarms that escaped from the Somalilands in January 1952 caused the spring infest tion across the Near East which in turn led to the heavy summer attack on Pakistan and India. Unless drastic measures are taken now, a similar sequence of events may recur, but in 1953 it cannot be expected that all swarms will turn north. Some will almost certainly invade Kenya, Uganda and Tanganyika.

The present locust situation is marked by two heavy concentrations of swarms, one to the east in Pakistan and India, the other in the Somali Peninsula, with some swarms also present in the Anglo Egyptian Sudan, the Aden Protectorates and probably the Yemen.

The Desert Locust plague might well have got out of hand earlier this year to overwhelm many agricultural regions. The campaigns were however so successful that no appreciable crop damage was caused in any area. This was a remarkable feat which demonstrates that a locust plague can be suppressed by modern methods of control and campaigning.

But the plague has not been eliminated and dangerous reserves of swarms remain to be dealt with. Nevertheless, there is good reason to hope that intensified effort, sustained by increasing co-operation between the countries concerned and aided by contributions from such agencies as FAO and the U.S. Point Four Program, will achieve even greater results in future and will continue to keep the Desert Locust in check and prevent the loss of valuable crops.

# San José Scale in Western Europe in 1951

V. E. WILKINS
European Plant Protection Organisation

SAN José scale, *Aspidiotus* (*Quadraspidiotus*) *perniciosus* Comst., a dangerous pest established in all five continents, was first found in Europe in 1898 on produce imported from the United States through Hamburg. However, it was not until 1931 that the scale was discovered in the field, both in Portugal and in Austria. It was later reported in Bulgaria, Hungary, Romania and Yugoslavia. Apparently the only country in southern Europe which is still free of the pest is Greece. Southern Germany and the Netherlands also have it, although northern Europe as a whole has so far escaped infestation. There is no biological reason why the scale should not establish itself in all European countries.

Because of this, and because of the economic importance of the pest both as a killer of fruit trees and a serious hindrance to international trade, San José scale was listed, along with Colorado beetle, potato root eelworm, potato wart disease and pests of stored foods, as one of the pests and diseases to which the European Plant Protection Organisation (EPPO) should devote particular attention. Its comparatively recent introduction into Europe makes such special attention all the more necessary.

An EPPO Working Party has already decided upon appropriate phytosanitary regulations to deal with the danger of further extension of the scale, and recommendations have been submitted to the European member Governments of the Organisation (cf. Report of Quarantine Working Party, EPPO, Paris, February 1951). Reports have now been received from all of the Organisation's member countries on the position of the pest in 1951. A summary of these reports is published below. Countries and territories covered are grouped geographically in four sections: S.W., N.W., N.E. and S.E. Mediterranean countries, such as Algeria, are included in S. W. Europe.

## South-West

*Algeria.* The position of San José scale in Algeria, which has not changed appreciably during the last few years, remained stationary in 1951. In the department of

Alger, where the pest was first recorded, the main infested areas are localized in the regions of Boufarik and Birkadem, with sporadic outbreaks at some other centres in the Sahel and the Mitidja. Apart from these areas and those of Palestro, in the interior, the department is free of the pest. In Oran, light localized infestations occur at some ten points in the districts of Oran and Mostaganem. In Constantine, the only two outbreaks discovered during the last few years, in the districts of Bougie and Bone, have been stamped out, and the department was considered to be free of the pest in 1951.

Generally speaking, the plum is the fruit tree most readily attacked, followed by peach, pear, apple, apricot and cherry. Infestation is generally very slight. Some credit for keeping the pest in check must be given to the action of parasites, particularly *Aphytis mytilaspidis* Le Baron; but the main cause has been the energetic control system, including the uprooting and burning of infested nursery stock and the chemical treatment of orchards during the winter.

San José scale has never been a real threat in Algeria; in fact, it has always proved much less dangerous than some other scale insects against which no country has introduced special legislation.

*Portugal.* In 1951, outbreaks of San José scale were recorded in six out of nine of the country's maritime provinces, while none of the five provinces in the interior were affected. Control of the scale was carried on thoroughly: 74,000 fruit trees had two treatments with white oil emulsion, the first during the winter with 3.2% emulsion, and the second in May, with 1.6% emulsion. These treatments, for which just over 3,000 gallons (138 hl.) of insecticide were used, proved highly effective.

San José scale was first found in Portugal in 1931, in the region of Aveiro, but it had probably been introduced five or six years earlier with plants coming from the United States. At that time no phytopathological service, properly so called, existed in the country. However, immediately after such a service was set up in 1932, a thorough-going effort was made to stamp out the outbreak at Aveiro, but this proved impossible because the pest had spread during those early years when there was no organised service to prevent it. It was soon found present in nurseries in the north of the country and later in the centre, and some of the main fruit-growing areas became infested. Initial steps taken included the destruction of several thousands of young nursery stock, the prohibition of the sale of plants from infested nurseries and the installation of fumigation chambers for treatment of suspected plants with HCN.

Damage: although the economic importance of the pest is not disputed, it does not seem to cause as much damage in Portugal as in some other countries. The uncertain climate seems to upset its normal cycle of development. The long dry summers which sometimes occur lead to a very high mortality at the stages of development which precede hibernation. The greatest damage occurs among young trees, which may be killed by scale attack. In mature orchards, sprayed with oil emulsions, there is little damage, either to the trees themselves or to the yield.

Control: various methods have been tried out, including spraying with anthracene and vegetable oils and with lubricating oils either alone or mixed with dinitrocresols or thiocyanates, as well as fumigation with HCN. With the exception of anthracene oil spray, which is clearly less effective, all methods have given good results. The choice of method is governed by the conditions of cultivation in the district concerned, and by the economic circumstances.

Legislation: treatment against the scale is compulsory by law. Growers whose holdings are infested receive help in the form of the loan of apparatus and the provision of free insecticides. Nurserymen pay for their treatments.

*Spain.* No new outbreaks of the San José scale were reported in 1952, and damage has been negligible, partly by reason of the control exercised and partly because of the very slight virulence of the scale in the climate of eastern Spain. The first outbreak of San José scale was discovered in 1935 in the province of Barcelona. Not until 1949, however, was there appreciable infestation of trees in the neighboring province of Lérida. In the same year two isolated centres were found in the provinces of Cas-

tellon and Valencia, which spread somewhat in 1950 but were not of great importance.

Fumigation by HCN has been practised in Spain since 1907.

### North-West

*Channel Islands, Great Britain, Ireland and Luxembourg.* San José scale has not yet been recorded and is believed not to exist there.

*France.* In 1951, the principal areas of infestation with San José scale were the Cannes–Grasse region, on the Mediterranean coast, and certain parts of the Lyons region. Secondary centres were also to be found in the departments of Cher and Nièvre. (For a detailed account of control methods, bio-ecological observations, etc., in France, see the EPPO Report on the Paris Technical Conference of April 1951).

### North-East

*Belgium.* San José scale has not been discovered in Belgium. The necessary precautionary measures have been taken to prevent its importation.

*Denmark and Luxembourg.* San José scale has not yet been recorded.

*Germany (Federal Republic).* In 1951, the main center of infestation with San José scale was the Heidelberg area, where the pest was first discovered in 1946. Isolated cases are reported southward of this area as far as the southern districts of the new South-Western State.

A number of isolated cases in northern Germany and in Bavaria, caused by imports of produce from the Netherlands, have been successfully dealt with by intensive control. Over 100 additional men were employed for this purpose. The areas thus controlled can now be considered free from the scale.

A summary of control methods employed in Germany is contained in the EPPO Report on the Paris Technical Conference of 1951.

*Netherlands.* Tracing of San José scale infested plant material was actively pursued in 1951, following the discovery of the pest on isolated plants in a number of private gardens, mainly in the south, in the winter of 1949–50. All plants found to be infested are destroyed.

### South-East

*Austria.* The spread of San José scale in Ausrria, where the pest has been established for some twenty years in the east and south, was very slow in 1951, owing to the high rainfall.

A full account of the incidence in Austria, with details of control methods employed, resistant and susceptible fruit varieties, natural parasites, etc. was published in the EPPO Report on the Paris Technical Conference of April 1951.

*Greece.* San José scale has not been recorded in Greece.

*Italy.* San José scale, though also recorded in Campania and Sicily, is established only in the north and the centre of Italy. Control continues to be very thorough and results in 1951 have been satisfactory.

*Switzerland.* Following the reduction of the outbreaks in the Ticino and Valais, as a result of energetic control measures, there remained at the end of 1951 only two or three communes in the extreme south of the Ticino, some sections of the town of Lugano, and, in Valais, the commune of Saxon, in which control had not yet been completed. These places will be cleared of infestation by the end of 1952. Former points of infestation are watched for many years until it is quite certain that the outbreak is completely stamped out.

Legislation: woody plants coming from suspected regions must be fumigated before being put on the market. The exact situation in each region is known through systematic inspection of all susceptible plants in orchards, nurseries, hedges, private gardens and parks in urban districts. Contaminated plants are treated under tarpaulins or destroyed. Further, only those plants which bear a lead seal or coloured distinguishing mark, indicating that they have been disinfected, can be transplanted in Valais. Railways and post-offices refuse consignments of plants coming from these regions when they are not accompanied by a phytosanitary permit. Road traffic is supervised by the police.

*Yugoslavia.* In 1951, practically the entire area north of Belgrade, up to the Austrian, Hungarian and Romanian borders, was severely infested, and there were a number of outbreaks in other parts of the country.

In Croatia, a region comprising thirteen districts south of Zagreb is infested. In Bosnia, there are large infestations in the districts of Samac, Derventa and Bosanski Brod, and a number of localized infested areas. In Serbia, in addition to the whole of Voyvodina, infestation has spread to the districts of Belgrade and Rankovicevo. Many localized infestations occur in the west of the Morava valley. San José scale has also been recorded in the province of Komet and in Macedonia.

The pest was first recorded in Yugoslavia in 1934, near the Hungarian frontier; it has since spread far westward and southward.

# Potato Blight in Chile

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CHILE, one of the most ancient potato growing countries of the world, has only recently been confronted with the problem of late blight caused by *Phytophthora infestens*. Although neighboring countries such as Peru, Bolivia and Argentina became infested years ago, the disease was not recognized in Chile before the second half of 1950.

This was chiefly due to geographic and climatic conditions which prevent the introduction and preclude the survival of the air–borne sporangia of the causal fungus. The possibility of introducing this disease by tubers was reduced as Chile, until very recently, did not need to import potatoes from abroad.

Despite these barriers, the disease invaded and swept through Chile within a relatively short period of time. There are strong indications that the initial infection occurred not later than the end of 1949, in southern Chile (Province of Chiloé, 42° latitude) from where the disease spread throughout the country up to La Serena (30° latitude) apparently within one or two seasons. The plague was presumably introduced with potatoes which might have been used as seed; the fact that Chiloé province is the main source of supply of seed potatoes for the whole country probably accounts for its rapid spread.

## Situation in 1950-52

The total loss of potatoes due to blight in Chile in 1950/51 amounted to at least 23 percent of the production prior to infestation. Most severe losses occurred in the region of La Serena and in the southern provinces of Chiloé, Llanquihue, Osorno, Valdivia and Cautin. The mean loss there is estimated as being at least 40 percent of the yield.

Incidence and distribution of blight vary with Chilean climatic conditions. Generally, the more southern the region, the greater the amount of precipitation and also the menace of blight.

However, in La Serena where precipitation did not exceed the 100 mm. level within the period concerned, blight was epidemic in an uninterrupted period of more than twelve months. The reason for this seemingly abnormal behaviour of blight was the high air humidity combined with relatively low temperatures. These permitted the dew to accumulate on the potato leaves in the irrigated areas nearly every night. The dew film, frequently persisting up to the late morning, was sufficient to allow the parasite to enter the host tissues.

As the summer season of 1951/52 was abnormally dry and hot, blight did not develop to such an extent as in the previous season. Nevertheless, it occurred locally in epidemic proportions almost throughout Southern Chile. This probably means that blight will never disappear in Chile, but the degree of infestation may vary from year to year.

Weather conditions, in normal years most favorable to blight over wide areas of Chile, are not the only factors which led to the great losses in 1950/51. In the coastal regions and in areas near the great lakes of Southern Chile winter temperatures seldom reach freezing point. As a result, numerous small potato plots are sown during the

cold season, and in these areas the parasite finds growing potato plants almost throughout the year.

Further foci of infection are the volunteer plants growing from tubers left in the soil at harvest. Similar conditions are found in the coastal district of Central Chile where. as in La Serena, two or three crops are grown every year.

If climatic conditions are favorable to this disease, there is an almost unbroken cycle of infection throughout the year. In such cases numerous plants can be destroyed by airborne infections very soon after emergence from the soil and an almost total loss may ensue.

Elsewhere, for example, in the Central Valley near Santiago, potatoes are grown only from spring to the end of summer, because of frequent night frosts during the cold season. There the cycle of infections is broken each year, as is the case in the potato–growing countries of the Northern Hemisphere.

In certain regions, wild solanaceous plants which proved to be susceptible to blight may serve as hosts in the very early spring. For instance, *Solanum brevidens*, which is rather common in virgin forests in Southern Chile, was found to be severely intected by blight as early as November.

Another factor, which contributed to the blight epidemic in 1950/51, was the extreme susceptibility of the prevailing variety, usually called Corahila. This variety, consisting of numerous genotypes, catches the disease much earlier in the season than varieties of the European type; hence the disease reaches epidemic proportions much faster than in other varieties, such as President.

Moreover, all Corahila forms appear to be much slower in setting tubers and in tuber growth than European varieties. Consequently, the blight fungus very often prevents the development of the plants at a time when the tubers are still very small.

From this, it is indicated that the Corahila potato should be replaced by other types, which are less susceptible to blight or possess a true resistance to blight due to hypersensitivity. The Corahila variety however enjoys the high preference of Chilean housewives because of its particular cooking quality, which is believed to be associated with such characteristics as red skin, yellow flesh and a certain irregular shape. As there are no European or American potatoes which combine field resistance to blight (Ackersegen or President standard) and good cropping capacity with the qualities typical of Corahila, the introduction of varieties from abroad can serve only as a first aid action.

Chile, therefore, has to start large–scale potato breeding to produce varieties which possess not only field resistance such as Ackersegen or President, or even true resistance, but also the culinary qualities and some of the characteristic features of the Corahila tubers. Otherwise potato growing will be considerably reduced by farmers.

This will affect severely the economic conditions in some parts of Southern Chile, in the province of Chiloé, for example, the potato is at present the only cash crop and the principal basic diet of the common people.

## Other Preventive Measures

Hygienic control and application of fungicides should also be practised in Chile, although, the economic feasibility of the latter measure in the various regions has yet to be studied. In regions where blight epidemic appears early in the season, it would be necessary to start spraying very early and to repeat at relatively short intervals to ensure that new leaves developed would be protected up to blooming time. This naturally raises the question of expense of labour and fungicides, compared with regions where blight does not become epidemic before the blooming time of the potatoes.

Average yields of potatoes in the most critical regions, such as Chiloé and the neighboring islands, are deplorably low because of antiquated growing methods. These should be improved before application of fungicides can be recommended on a wide scale.

Discontinuation of winter potato growing and burning of primary foci of infection by over–concentrated fungicides will prove essential in delaying blight incidence in many parts of Southern Chile. These and other measures, however, are largely complementary and in varying degree must all be applied if they are to become effective.

# Diseases of Economic Plants in Iraq

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Following the writers' arrival in Iraq in late June 1952 on an assignment under the FAO Expanded Technical Assistance Program, preliminary surveys have been made of plant diseases in the vicinity of Baghdad and in the northern parts of the country. During the trip to the north in July, the writer, accompanied by Mr. Abdul Azzak Al Azzami, Plant Pathologist of the Abu Graib Experimental Farm, traveled into the four liwas, i.e., Kirkuk, Sulaimaniya, Erbil and Mosul, which constitute the entire northern half of the country. This area represents the major fertile agricultural regions of Iraq, where various field crops, vegetables, fruits and forest trees are grown.

The present notes, prepared with the assistance of Mr. Abdul Razzaq Adhami, in charge of the Section of Plant Pathology of the Abu Graib Experimental Farm, summarize briefly the observations of these survey trips, supplemented with previous records which have been made available through the courtesy of Mr. Adhaim and Mr. Azzami.

The climate of Iraq has a very definite retarding effect on the development and spread of plant diseases. Annual rainfall is very low and only in the northern part of the country where it averages about fifteen inches can any crop be grown without irrigation. All other regions are dependent upon irrigation and where water cannot reach desert conditions prevail.

There is no rainfall in Iraq from June through September and during this period the mean temperature is high, 90 to 95° F. and the mean relative humidity low, 35 to 45 percent. At Baghdad, during August, for a 24 year period the mean temperature was 94.5, the mean maximum 110.4, the mean minimum 78.5° F. and the mean relative humidity 40 percent. Annual rainfall at Baghdad during the same period was 6 inches.

Foliar diseases of all plants occur sparingly and only occasionally cause significant damage. In orchards and vegetable fields in northern Iraq, application of fungicides has not been recommended or practised to control such occasional outbreaks.

Under irrigation, certain soil-borne diseases occur rather commonly and often cause considerable losses. The root-knot nematodes are widespread and prevalent in some areas on crops such as tomato, okra, eggplant, almonds and figs.

In the orchards, the fruit trees are planted so closely that they develop a jungle-like growth favorable to disease development and make it impracticable for fungicidal spray or dust application. There is no pruning, no lopping of dead branches, and the fruit is not culled or graded. The introduction of proper cultural practices would greatly reduce the incidence of diseases and pests and facilitate the adoption of control measures.

Nutritional disorders have been observed on various plants in all the places visited. It indicates the necessity for detailed soil studies in these areas.

## Crops and Diseases

*Cereals.* Barley and wheat are the two major grain crops and are grown during the winter, for the most part under natural rainfall in the northern sections of the country. Rice, an important summer crop, is grown under irrigation, to some extent in the north but mainly in the southern lowland areas. Millet, giant millet (grain sorghum), and maize are also grown as irrigated summer crops.

No disease has been found causing severe damage to any cereal crop and, generally speaking, diseases are not of major economic importance. Wheat rusts have been observed only occasionally during the survey and apparently had little effects on the yield, as the heads were usually full and the kernels

plumb. Bunt, mostly caused by *Tilletia foetida*, was found in almost all wheat fields visited, but always in low percentages. Copper carbonate, the only seed disinfectant in use, has been applied to some extent in treating wheat for this disease, especially in Mosul liwa.

The following are the common diseases known to attack cereals:

Powdery mildew (*Erysiphe graminis*) - wheat and barley
Stem rust (*Puccinia graminis*) – wheat and barley
Leaf rust (*P. rubigo–vera*) -- wheat and barley
Stripe rust (*P. glumarum*) – wheat and barley
Leafspot (*Leptosphaeria tritici*) – wheat
Loose smut (*Ustilago tritici*) – wheat
Flag smut (*Urocystis tritici*) – wheat
Bunt (*Tilletia caries* and *T. foetida*) – wheat
Leaf blotch (*Septoria tritici*) – wheat
Stem nematode (*Tylenchus tritici*) – wheat
Leaf rust (*Puccinia hordei*) – barley
Covered kernel smut (*Sphacelotheca sorghi*) – giant millet
Loose kernel smut. (*S. cruenta*) – giant millet.
Long smut (*Tolyposporium ehrenbergii*) – giant millet
Blast (*Piricularia oryzae*) – rice

*Cotton.* This is grown around Baghdad, adjacent areas to the south and in small amounts in the north, all under irrigation. No foliage diseases have been seen and wilt is of rare occurrence. Boll and lint rots caused by *Rhizopus* sp., *Aspergillus* sp. and *Nematospora coryli*, are present and usually are quite severe following boll injuries by the spiny boll worm (*Earias insulana*).

*Tobacco.* It is possible to grow this only in the northern valleys under irrigation. Powdery mildew (*Erysiphe cichoracearum*), is a common disease and in some seasons affects leaf quality. Mosaic and other virus diseases have been observed and broom–rape (*Orobanche* sp.), a phanerogamic parasite, is common in tobacco patches.

*Vegetables.* The principal vegetables grown are onion, lettuce, beet, turnip, cabbage, tomato, eggplant, okra, cucumber, squash, watermelon and muskmelon. They are mostly grown under irrigation in areas adjacent to the larger cities and are frequently planted beneath trees in orchards. In certain localities, *Fusarium* wilt and rootknot are a limiting factor in the growing of vegetables. Other diseases are of minor economic importance.

The following are the more common diseases of vegetables.

Downy mildew (*Bremia lactucae*) – lettuce
White rust (*Albugo candida*) – turnip
Downy mildew (*Peronospora destructor*) – onion
Powdery mildew (*Erysiphe cichoracearum*) – watermelon, muskmelon, cucumber, squash and okra
Powdery mildew (*Oidiopsis taurica*) – tomato
Leafspot (*Alternaria brassicae*) – cabbage
Leafspot (*Cercospora beticola*) – beet
Wilt (*Fusarium* spp.) – watermelon, muskmelon, cucumber, squash and tomato
Mosaic (virus) – lettuce, tomato and eggplant
Rootknot (*Meloidogyne* spp.) – lettuce, tomato, eggplant, okra, watermelon, muskmelon, cucumber, and squash
Broom–rape (*Orobanche* sp.) – tomato

*Dates.* This is a major crop and ranks with barley as Iraq's most important exports. An estimated 30,000,000 date palms are grown along the Tigris and Euphrates rivers and their tributaries from just north of Baghdad to the Persian Gulf, the greatest number being in the Basra area. Inflorescence rot (*Mauginiella scaettae*) is the only disease of economic importance and it occurs only in seasons when the winter is prolonged and accompanied by low temperatures and abundant moisture. There has been no destructive outbreak of this disease in the past few years.

*Citrus.* Growing is confined to the Baquba region near Baghdad. Orange, lemon and lime are the three fruits grown. As citrus trees cannot stand the hot sun, they are planted in the shade of date palms under irrigation. Brown rot or gummosis (*Phytophthora citrophthora*) is the only disease of importance and it causes the decline and death of trees in some groves.

*Other fruits and nuts.* Many fruits, grapes and some nuts are grown in localized areas from Baghdad northward. They are mostly grown under irrigation in areas adjacent to the larger cities. Inadequate transportation facilities make it difficult to move perishable fruits any distance. Fig, apricot, plum, peach, apple, pear, pomegranate, grape, almond and pistachio represent most of the cultivated fruits and nuts.

Most of the diseases which occur are of minor importance even when consideration is given to the fact that no chemical control

using sprays and dusts is practised. Rootknot limits the growing of figs and almonds in some localities. A wilt disease of pistachio tree has been found in most orchards in the Mosul area and has caused considerable damage. A fungus identified as *Rosellina necatrix* was found on the roots of dead or dying trees, but it is uncertain if it is the cause of the wilt. A blackstem disease, also of undetermined cause, has been found to cause some losses in apple trees.

The following are the more common diseases of fruits and nuts:

Scab (*Venturia inequalis*) – apple
Blackstem (undetermined) – apple
Powdery mildew (*Uncinula necator*) – grape
Powdery mildew (*Sphaerotheca pannosa*) – peach
Powdery mildew (*Podosphaera oxycanthae*) – apricot, apple and pear
Leaf curl (*Taphrina deformans*) – peach
Leaf curl (*T. pruni*) – plum
Rust (*Puccinia pruni-spinosae*) – peach, plum and apricot
Shot-hole (*Cylindrosporium padi*) – plum, peach and apricot
Leaf blister (*Polystigmina rubrum*) – plum and almond
Rootknot (*Meloidogyne* spp.) – fig and almond
Wilt (undetermined) – pistachio

*Other crops.* Sesame is widely grown as a summer crop under irrigation. Its seeds which yield oil are exported, and large quantities are used locally in garnishing bread and cakes. Stem canker (*Rhizoctonia* sp.), rootknot (*Meloidogyne* spp.), and broom-rape (*Orobanche* sp.) attack sesame but cause minor damage only.

Alfalfa is cultivated in date orchards and irrigated fields around Baghdad and other cities to the south. It is cut throughout the year, made into bundles and brought into the markets while still green. Powdery mildew (*Erysiphe polygoni*), leafspot (*Pseudopeziza medicaginis*), rust (*Uromyces striatus medicaginis*) are occasionally found on alfalfa but with little damage.

Bermuda grass is the most common perennial grass in Iraq and is found wherever there is sufficient water for plant growth. It is considered an obnoxious weed in irrigated summer crops but is also considered an excellent lawn grass and is used extensively for forage purposes. Tarspot (*Phyllachora cynodontis*), head smut (*Ustilago cynodontis*) and rust (*Puccinia cynodontis*) are found on Bermuda grass without much damage.

# Progress in Plant Protection in India

V. P. Rao

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Before the establishment of the Central Directorate of Plant Protection, Quarantine and Storage in 1946, practically no large-scale measures for the control of plant pests and diseases had been carried out on scientific lines in India except in the case of the Desert Locust. Since the inauguration of the Directorate, nation-wide campaigns have been promoted against major pests and diseases.

The main functions of the Central Directorate are as follows:

(1) to organise campaigns against pests and diseases of all-India importance;
(2) to take adequate measures against the entry into India of new pests and diseases through imported plant material;
(3) to regulate the inter-State movement of plants so as to prevent the further spread of pests and diseases to new areas;
(4) to regulate the import of natural enemies for the control of crop pests;
(5) to collect, collate and disseminate information about the occurrence, spread and outbreaks of pests and diseases and to assist States in carrying out field operations;
(6) to assist the States in improving the storage of food and seed grains and other agricultural commodities.

The following pages summarize briefly the progress made by the Directorate in recent years.

## Locust Survey and Control

Since 1939, the Government of India has maintained a permanent Locust Warning Organisation, which is now merged with the Directorate as one of its divisions. It keeps a careful watch over the fluctuations in locust populations in correlation with rainfall and other meteorological conditions in the desert outbreak areas, and disseminates information collected from various States and other countries.

With the initiation of a new locust cycle in 1949-50, the desert outbreak areas have been divided into three circles. The staff at present is distributed over 75 outposts, several of which are situated near the Indo–Pakistan border.

*Progress of anti–locust campaign.* After a lull in locust activity during 1947 and 1948, gregarious breeding took place in some parts of Eastern Arabia in March 1949, and soon after in Baluchistan, giving rise to swarms. A sudden rise in locust population was observed towards the end of May, and this infiltration continued during June and July. Control operations were organised against wide–scale scattered breeding.

Late migrants at the end of July produced a second brood. At the end of September, a yellow swarm entered Jaisalmer from the northwest and laid eggs in the western parts of Jaisalmer. Large bands of hoppers emerged over a gross area of about 250 square miles (647.5 square kilometers) near Bahawalpur State. The situation was soon brought under control and only a couple of small swarmlets developed in Jaisalmer and Bikaner areas.

During 1949/50 no swarm overwintered in India. The country was, however, invaded by about 36 swarms between the middle of May and July. They laid eggs in July–August and about 50,000 square miles (129,500 square kilometers) were infested by hoppers. These were so effectively controlled that in August–September only about half a dozen swarmlets developed. About the same number invaded India from Pakistan. Five swarms were destroyed. During September–October, about 2 dozen more swarms again came from Pakistan into India and laid eggs over 25,000 square miles (64,750 square kilometers). Control operations against hoppers were successfully carried out and only a few swarms developed.

Some swarms survived the winter of 1950/51 and bred in Punjab during February and March, 1951. Energetic action was taken by the Punjab authorities and the pest was brought under control with very few escapes. Fresh swarms began arriving from Western countries from the middle of May as usual and in two months about 50 swarms entered India. Intense breeding took place during July and August, infesting a gross area of 45,000 square miles (116,550 square kilometers). Nevertheless, extremely few hopper bands were allowed to pass the third stage after a completely successful operation.

An American unit of planes which had been carrying out aerial spraying in Iran under Point Four Program, came to India during July, 1951. Three small fixed wing planes (Piper cubs) carried out spraying from July to September near Bikaner. The results showed that these fixed–wing planes can be used economically during emergencies only when locust hoppers are discovered late and time is therefore an important factor, or when locust swarms suddenly attack cultivated tracts.

It is already clear that the locust attack will be serious in 1952. A general rise in the number of scattered locusts in western Rajasthan began in early May and several immature immigrant swarms arrived from the west during June. By July mature swarms with widespread egglaying were reported from Rajasthan, Delhi, East Punjab, Pepsu and Uttar Pradesh. Hatching began towards the end of July and large scale control operations will again be necessary.

## Campaigns against other Insect Pests

*Biological Control of Insects.* One of the campaigns concluded recently by the Directorate is the checking of the spread of fluted scale (*Iccrga purchasi*), a pest of international importance, which entered Madras State in South India some years ago and spread to adjoining states and as far north as Poona in Bombay State. This scale established itself on wattles and a number of wild plants.

As a potential pest of citrus and other fruits, its spread was fraught with serious consequences. A Central Laboratory was

theretore established for mass breeding and release of a natural enemy, *Rodolia cardinalis*, under a co-ordinated control scheme. As a result, Coorg and Bombay are now practically free from this insect and its incidence in the States of Madras, Travancore and Mysore has been considerably reduced.

*Storage of agricultural commodities.* A considerable amount of extension work for proper storage of grains and other agricultural commodities like oil seeds, dry vegetables and potato has been carried out in rural areas. Schemes of bulk storage of seed grains were prepared for Ajmer–Merwara and constructional improvements were made in the existing seed stores in Delhi and Ajmer States. A model store of 1,000 maunds (1 maund = 37.32 kg.) capacity was constructed in Ajmer; and the farmers, convinced by the value of this type of bin, constucted similar bins of 500 maunds capacity in some villages.

Training in the methods of proper disinfestation and storage of food and seed grains was organized at various regional centres. Magnesium oxide was developed for use as an innocuous insecticide in the villages.

## Controlling Insects of Various Crops

*Paddy rice.* Large-scale control operations were carried out against the following paddy pests in different parts of India by the use of insecticides such as BHC and DDT, supplemented by cultural measures:

Swarming caterpillar (*Spodoptera mauritia*)
Stem borer (*Schoenobius incertellus*)
Case worm (*Nymphula depunctalis*)
Gall fly (*Pachydiplosis oryzae*)
Rice bug (*Leptocorisa varicornis* and *L. actua*)
Paddy grasshopper (*Hieroglyphus banian*)
Rice hispa (*Hispa armigera*)
Blue beetle (*Leptispa pygmoea*)
Green jassid (*Nephotettix bipunctatus*)

*Sugar cane.* Of the many insects infesting sugar cane in India, the most serious are the top-shoot borer (*Scripophaga nivella*), stem borer (*Argyria sticticraspis*, *A. tumidicostalis*, *Diatraea auricilia*, and *D. venosata*), new pyralid borer (*Chilo trypetes*), root borer (*Emmalocera depressella*) and leaf hopper (*Pyrilla perpusilla*) especially in Bombay, Uttar Pradesh, Punjab, Bihar and Orissa. The leaf hopper was controlled effectively by dusting or spraying with BHC, while the stem and root borers were kept in check by encouraging their egg parasites.

*Millets.* As one of the major pests attacking kharif crops such as jowar, maize, bajra, etc., the Phadka grasshopper (*Hieroglyphus nigrorepletus*) was brought under effective control by dusting with BHC. The Deccan wingless grasshopper (*Colemania sphenarioides*) which was most serious in Bombay, Hyderabad, Madras and Mysore, the surface grasshopper (*Chrotogonus* sp.) in Punjab and Madras, the hairy caterpillar (*Amsacta moorei* and *A. albistriga*) in Uttar Pradesh, Delhi and Bombay States and the earhead bug (*Calocoris angustatus*) damaging jowar crop in Mysore and Madras States, were successfully controlled by dusting with BHC or spraying with DDT. Mechanical methods of control, viz. ploughing up the stubbles after harvest were adopted against the stem borer (*Chilo* sp.) of maize.

*Winter crops.* Winter crops, particularly wheat, gram, pea and potato, etc. were found infested with a number of important pests. Of these, cutworms (*Agrotis ypsilon*, *A. flammatra* and *Euxoa segetis*) were very serious in the States of Uttar Pradesh, Delhi, Ajmer, Bihar and West Bengal and were effectively controlled by the application of insecticides. Jute crop was infested with the semi-looper (*Cosmophila sabulifera*) and the Bihar hairy caterpillar (*Diacrisia obliqua*) in the States of West Bengal, Orissa and Bihar. The semi-looper was particularly serious and was treated with BHC or DDT, resulting in an estimated gain of Rs. 51 per acre in West Bengal.

*Cotton.* The cotton crop was found infested by a number of important pests, such as bollworms (*Platyedra gossypiella*, *Earias insulana*, and *E. fabia*), cotton leaf roller (*Sylepta derogata*), cotton jassid (*Empoasca devastans*) and red cotton bug (*Dysdercus cingulatus*). The jassids and leaf roller were very serious in Punjab and Uttar Pradesh.

*Fruits.* The mango hopper (*Indiocerus* sp.), mango mealy bug (*Drosicha mangiferae*), lemon butterfly (*Papilio demoleus*), citrus psylla (*Diaphorina citri*), bark boring caterpillar (*Inderbela* sp.), stem borer (*Batocera rubra*), citrus white fly (*Aleurocanthus* spp.), citrus leaf miner (*Phyllocnistis citrella*), San José scale (*Quadraspidiotus perniciosus*), woolly aphis (*Eriosoma lanigera*) and fruit sucking

moths are the major pests of fruits and fruit trees in different parts of India. All these pests were effectively treated with insecticides and the estimated gains varied from Rs. 50 to Rs. 100 per acre.

*Vegetables.* The serious pests in different parts of the country are the red pumpkin beetle (*Aulacophora foveicollis* and *A. atripennis*) on cucurbits; Hadda beetle (*Epilachna* spp.) on brinjal, potato and cucurbits, etc.; fruit and shoot borer (*Euzophera perticella* and *Leucinodes orbonalis*) on brinjal; thrips (*Thrips tabaci*) on onion and chillies etc.; aphids on cabbage, mustard, brinjal, potato, etc., cabbage butterfly (*Pieris brassicae*) and mustard sawfly (*Athalia proxima*) on mustard, turnip, etc.

These pests were controlled over large areas in Punjab, Delhi, Uttar Pradesh, Madhya Pradesh, Orissa, East Bengal, Madras, Mysore, Hyderabad and Bombay, chiefly by dusting with Pyrodust or spraying with Pyrocolloid or nicotine sulphate. Thrips (*Scirtothrips dorsalis*) infesting chillies in Madras, Madhya Pradesh and Hyderabad were effectively checked by spraying with fish oil rosin soap or with nicotine sulphate. As a result of these operations, the estimated gain in Hyderabad was found to be Rs. 134,027 in total, while in Madras it was Rs. 156 per acre.

Field rats, damaging various crops like paddy, sugarcane, wheat, vegetables, etc. in different states, viz. Delhi, Ajmer, Uttar Pradesh, Madhya Pradesh, Madras, Patiala and East Punjab States Union, Punjab and Mysore, were effectively eradicated by baiting them with 2 percent zinc phosphide or by fumigating their burrows with Cymag or Cynogas.

## Plant Diseases and Weeds

Numerous surveys were made during the past years in different States of India. Several diseases like the yellowing rot (*Corynebacterium tritici*), ear-cockle (*Anguiluillina tritici*) and leaf-spot (*Septoria tritici*) of wheat, hitherto recorded as minor diseases, were seen to assume importance. Others with restricted distribution, viz. flag smut (*Urocystis tritici*) of wheat recorded in Punjab and Delhi and bunchy top (virus) of banana reported from Travancore-Cochin, were observed in new areas in Rajasthan, and Bombay and Orissa respectively.

The following new diseases were recorded:

Little leaf (cause unknown) of guava
Wilt (*Fusarium* sp.) of cumin at Ajmer Merwara
Sugarcane rust (*Puccinia kuehnii*) in the State of Bombay
Leaf-rot (*Sclerotium* sp.) on *Trapa bispinosa* in Delhi State
Lead-spot (*Metasphaeria* sp.) on *Trapa bispinosa* in Delhi State
*Aspergillus flavus* on desert locust

*Wheat rust control scheme.* Wheat rusts, according to Dr. K. C. Mehta, could be controlled to a great extent in Peninsular India if the practice of sowing a second crop of wheat and barley during summer on the hills of South India could be discontinued. To try the efficacy of this method, a wheat rust control scheme was launched for a three years' period, beginning in 1948. In 1948-49, the scheme could not be effectively enforced; but it was fairly successful in 1949–50 and 1950–51, when very little if any summer crop was raised and even that was destroyed in most cases. The results, however, were not conclusive because of the short period covered.

## Campaigns against Diseases

*Paddy rice.* This crop is subject to several important diseases in India, viz. foot rot (*Fusarium moniliforme*), leafspot (*Helminthosporium oryzae*) and blast (*Piricularia oryzae*). Seed treatment with mercurial dressing and spraying with Bordeaux mixture or other copper fungicides were undertaken to combat these diseases. The extent of these treatments during the past three years is given in the Table. Resistant varieties were also distributed to minimize the losses.

Table 1. *Extent of major campaigns against crop diseases in India, 1949-52.*

| Crop and treatment | Area treated, in acres | | |
|---|---|---|---|
| | 1949–50 | 1950–51 | 1951–52 |
| *Paddy rice* | | | |
| Seed treatment | 159 740 | 85 470 | 157 850 |
| Copper sprays | 43 900 | 5 842 | 3 685 |
| *Sorghum* | | | |
| Seed treatment | 1198 300 | 455 740 | 1088 457 |

An algal weed, *Chara*, is also a serious menace to paddy cultivation in West Bengal and during the years 1951 52, large areas of paddy crop were sprayed with copper sulphate to eradicate it.

*Sorghum.* The most important and common disease of sorghum throughout India is grain smut (*Sphacelotheca sorghi*), which is easily controlled by seed treatment with organo–mercurials, copper carbonate dust or sulphur. The total acreage of treatment during the past three years is shown above.

*Wheat and barley.* To prevent seed-borne diseases, such as bunt (*Tilletia caries* and *T. foetens*) and flag smut (*Urocystis tritici*) of wheat, and covered smut (*Ustilago hordei*) and stripe (*Helminthosporium gramineum*) of barley, seeds to cover large acreage were treated with organo–mercurials in recent years. Dusting of the wheat crop with sulphur against rusts was also carried out on a limited scale in some parts of India to protect the seed crop.

*Sugar cane.* Roguing of diseased canes and planting of disease–free setts were undertaken to eliminate red rot (*Physalospora tucumanensis*), the most destructive disease affecting sugarcane. Removal and burning of infested clumps was practised against smut (*Ustilago scitaminea*). The *Striga* weed was also controlled by suitable measures.

*Potato.* Potatoes are affected with early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) chiefly in Assam and West Bengal and also to some extent in Uttar Pradesh, Bihar and Madras. The crop was sprayed with Bordeaux mixture or other fungicides, resulting in an estimated increase of 10–25 maunds in yield per acre.

*Vegetables and spices.* Appropriate control measures were adopted in various parts of the country against important diseases of vegetables and spices, viz. the onion blight (*Alternaria palanduii*), chillies fruit rot and turmeric leaf spot (*Colletotrichum capsicae*), cumin mildew (*Erysiphe polygoni*) and rot of ginger (*Pythium aphanidermatum*).

*Fruits.* Citrus trees affected with die–back (*Colletotrichum gloeosporioides*), canker (*Xanthomonas citri*), andoleaf fall and fruit rot (*Phytophthora palmivora*) were sprayed with Bordeaux mixture or other copper fungicides. Mango trees affected with powdery mildew (*Oidium mangiferae*), pink disease (*Corticium salmonicolor*) and leaf spot (*Gloeosporium* spp.) were also treated with fungicides.

*Palms.* Coconut and arecanut palms are commonly affected by the stem bleeding disease (*Ceratostomella paradoxa*), and bud rot and fruit rot (*Phytophthora palmivora* and *P. arecae*). In the States of Madras, Mysore, Coorg and Travancore-Cochin, palms were sprayed with fungicides and treated with sanitary measures over large areas.

*Coffee.* Coffee, which is an important plantation crop in the States of Madras, Mysore, Coorg and Travancore, is often seriously affected with rust (*Hemileia vastatrix*). Spraying with Bordeaux mixture a month after the blossom showers or after the initiation of vegetative growth reduced the disease considerably.

## Quarantine

*Inter-state quarantine.* Legislative measures have been taken to regulate the inter-State movement or plants in order to prevent further spread of destructive pests and diseases. The introduced San José scale and fluted scale, now successfully kept under control, have been notified under the Destructive Insects and Pests Act, and transport of their host plants from the infested areas is prohibited unless accompanied by a certificate of health. Other regulations have been drafted against the spread of the bunchy top disease of bananas from the Travancore-Cochin State, Orissa and Bombay, and another serious disease, probably of virus origin, of Guava from Ajmer–Merwara.

*Foreign quarantine.* Plant quarantine work on modern lines was initiated at the port of Bombay in 1949, and in 1951 a permanent fumigation house was completed, equipped with vacuum fumigation chambers and gas-tight fabrics for atmospheric fumigation. Facilities for hot water treatment of bulbs and sugarcane are also available.

Since this station was opened, all the plant propagation materials received at Bombay from foreign countries have been examined and treated before release. In a number of cases, the consignments, even though accompanied by health certificates, were found infested.

Pests were also intercepted in certain imported commodities in which one would

least expect to find them. For example, a sample consignment of wool from Australia was found to be infested by a pest of stored products and seeds of four species of weeds, all of which had not hitherto been recorded in India.

For the growing of suspected plants under quarantine conditions, a laboratory with glasshouses attached was established at Poona in 1950 to supplement the quarantine stations at sea ports, and a similar one is proposed for Calcutta.

Plans for the establishment of fully equipped quarantine and fumigation stations at two other main sea ports, Madras and Calcutta, have also been prepared, but cannot be carried out at present due to financial stringency. In view of the importance of preventing entry of pests across frontiers, a scheme for the establishment of quarantine stations on the eastern and western land frontiers will be implemented soon.

For the disinfection of specific commodities imported into India, an arrangement was made for the fumigation of American cotton at Madras in 1951. This avoided the unmanageable congestion at the Bombay docks, where delay in the fumigation of imported cotton might permit the introduction of the cotton boll weevil, and obviated the long rail haulage to the cotton mills in the south.

It is estimated that at least 75,000 bales can be imported and fumigated every year at Madras, allowing a substantial portion of the imported cotton to be diverted from Bombay. A similar scheme is being planned for the fumigation of unmanufactured tobacco at Bombay, Calcutta and Madras to prevent the entry ot the tobacco moth, *Ephestia elutella.*

*Disinfestation of exported commodities.* At the special request of certain exporting firms in India, some consignments of celery seeds, psyllium husks and walnuts were fumigated prior to export. These consignments reached the destined countries free from pests and were released by the authorities there without difficulty. As a result of this and in the interest of the country's trade, a self-supporting scheme tor fumigating agricultural products for export will start operating in 1953.

# News and Notes

*European Plant Protection Organisation*

The Convention establishing the European Plant Protection Organisation (EPPO) was signed in Paris on 18 April 1951. The Organisation is recognised by FAO as the regional organisation for Europe under the terms of the International Plant Protection Convention.

EPPO has recently published the report of a technical Working Party which met in London last June and considered the danger to European countries of pests and diseases which have recently been introduced into or observed in Europe and may spread within the continent. The Working Party recommends appropriate phytosanitary measures which might be taken by Governments to prevent the introduction of these pests and diseases to countries so far free. Copies of the report may be obtained free from EPPO, 14 rue Cardinal Mercier, Paris 9.

A conference was held under the auspices of EPPO in Cologne on 26–27 September to discuss the progress of control measures of sugar beet yellows. The conference was convened by the Plant Protection Service of Federal Germany, in conjunction with the sugar beet industry, and was attended by representatives of European countries infested with this virus disease of sugar beet.

EPPO will convene a technical conference in Sicily from 20–23 October 1952 to discuss pests and diseases of special interest to countries in the Mediterranean basin. The conference agenda has four main items: (1) methods of control of pests and diseases of citrus fruits; (2) measures to prevent the introduction of extra-European pests and diseases which would be dangerous to Mediterranean countries; (3) the incidence of Mediterranean fruit fly (*Ceratitis capitata* Wied.) in Mediterranean countries and the co-ordination of investigations into control measures; (4) pests and diseases of the vine, in particular Pierce disease and phylloxera. The Governments of all countries in the Mediterranean area have been invited to send representatives to the conference. FAO will be represented by observers.

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